The UK Electronic Cigarette Research Forum Briefing

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Electronic Cigarette Research Briefing – May 2025

This research briefing is part of a series of quarterly updates aiming to provide an overview of new studies on electronic cigarettes (e-cigarettes). The briefings are intended for researchers, policy makers, health professionals and others who may not have time to keep up to date with new findings and would like to access a summary that goes beyond the study abstract. The text below provides a critical overview of each of the selected studies then puts the study findings in the context of the wider literature and research gaps.

The studies selected do not cover every e-cigarette-related study published each quarter. Instead, they include high profile studies most relevant to key themes identified by the UK Electronic Cigarette Research Forum, including efficacy and safety, smoking cessation, population level impact and marketing. For an explanation of the search strategy used, please see the end of this briefing.

Let's talk e-cigarettes – University of Oxford podcasts Jamie Hartmann-Boyce and Nicola Lindson discuss emerging evidence in e-cigarette research. In the latest episode, they discuss emerging evidence in e-cigarette research and interview Eden Evins from Massachusetts General Hospital and Harvard Medical School, Boston about her randomised clinical trial of varenicline for youth nicotine vaping cessation.
This podcast is a companion to the Cochrane living systematic reviews of e-cigarettes for smoking cessation and interventions for vaping cessation and shares the evidence from the monthly searches. Subscribe with iTunes or Spotify to listen to regular updates or find all episodes on the University of Oxford Podcasts site. This podcast series is funded by Cancer Research UK (CRUK).

Cochrane Living Systematic Review of E-cigarettes for Smoking Cessation update
The latest update to the CRUK-funded Cochrane Living Systematic Review of E-cigarettes for Smoking Cessation was published in January 2025 and includes two new studies. A further update is currently underway.

New Cochrane Living Systematic Review of Interventions for Quitting Vaping
A new Cochrane Living Systematic Review of interventions for vaping cessation was published in January 2025. It includes 9 studies, with low certainty evidence of effectiveness of a text message-based intervention in young people and of varenicline; there wasn't enough evidence on other interventions to draw any conclusions. Searches for this review will now be undertaken monthly, with the review updated any time new studies emerge that could change, strengthen or weaken the conclusions.

Visit the website (https://www.cebm.ox.ac.uk/research/electronic-cigarettes-for-smoking-cessation-cochrane-living-systematic-review-1) for full information on both living systematic reviews, including briefing documents, and new studies found since the update.

You can find our previous research briefings at www.cruk.org/UKECRF.

If you would prefer not to receive this briefing in future, just let us know.

Commentary

This quarter, we highlight data from five new papers, three of which are systematic reviews, illustrating the continuing evolution of this evidence base.

Two papers this quarter shed light on nuances regarding flavouring. Using the Action on Smoking and Health Smokefree Great Britain Youth 2021 online survey, **Taylor *et al*** investigate the impacts of e-liquid package design on interest in trying products, with a particular focus on flavour descriptors. Participants were randomised to view a set of three images of e-liquids, varying based on packaging condition: one set was fully branded; one was white standardised packaging with usual brand names and flavour descriptions; and one was white standardised packaging with coded brand names and limited flavour descriptors. Standardised packaging limiting flavour and brand descriptors was found to reduce interest, whereas results for standardised packs with usual descriptors did not differ from fully branded packaging. This highlights the significance of flavour and brand descriptors, and the authors call for further research on this topic. In an update to a previous review exploring flavours in intervention studies of e-cigarettes for smoking cessation, **Lindson *et al*** find that an array of unanswered questions persist. There was no clear evidence that specific flavour profiles were associated with smoking cessation outcomes, but this may have been due to a paucity of data. Though overall, sweet flavours appeared to be preferred, this varied by context and population group.

Kundu *et al* also set out to update a previous systematic review, in this case, relating to the association between vaping and cancer. They found no evidence that never smokers who vaped had higher incidence or prevalence of lung cancer or of other cancers compared to people who never smoked or vaped, but this could be because of the relatively short length of follow-up in many of these studies. They note substantial evidence from biomarker studies that e-cigarette exposure is associated with various biomarkers reflective of cancer disease risk.

A new review led by **Begh *et al*** investigated associations between vaping and subsequent smoking in young people (in other words, the possible existence of what has been called a 'gateway' effect). At an individual level, data clearly illustrated that young people who vaped were more likely to go on to smoke than their non-vaping peers, but at the population level, data suggested a possibly inverse relationship between e-cigarette use/availability and combustible tobacco use in young people, more suggestive of a possible 'diversion' or 'off-ramp' effect. The authors conclude that data on the association between vaping and smoking in young people is hard to parse and largely unclear – further research is needed, especially in contexts outside of the US and Western Europe.

Finally, using data from the Smoking Toolkit Study, **Jackson *et al*** investigate trends in dual use of e-cigarettes and combustible tobacco products in English adults – they found the prevalence of dual use increased from 2016 to 2024 (from 3.5% to 5.2% of English adults). This was driven by an increase in vaping in adults who smoked, and occurred while overall smoking prevalence was declining. The largest increases were in younger adults, with no changes in older age groups (>55 years old). The authors note that the introduction of disposable e-cigarettes to the market contributed to the non-linear increase observed.

Together, these studies all point to the need for further research in this space, considering nuances of regulatory environments, packaging and flavour restrictions, and differential effects across population groups.

Taylor *et al:* Association of fully branded, standardized packaging and limited flavour and brand descriptors of e-liquids with interest in trying products among youths in Great Britain

Study aims

This between-subjects online study investigated perceived peer interest in trying e-liquids under varying packaging conditions. Participants were young people aged 11-18 (n = 1,628) responding to the Action on Smoking and Health Smokefree Great Britain (GB) Youth 2021 online survey. Respondents were randomised to view one of three conditions; three images of e-liquids with branded packaging, three images of e-liquids with white packaging with the usual brand names and flavour descriptors, or three images of e-liquids with white packaging with codes instead of brand names and limited flavour descriptors. They were asked to indicate which of the products they thought people their age would be most interested in trying. They could select a product, respond 'none of these,' 'don't know' or 'prefer not to say.' Those who responded 'prefer not to say' were excluded. Analyses were adjusted for sex, age, socioeconomic status, vaping status and smoking status.

Key findings

- Nearly half (48.2%) of respondents selected a product that they thought people of their age would be interested in trying; 25.4% selected no interest (i.e. 'none of these') and 26.4% selected 'don't know.'

- Participants who viewed the standardised white packaging with the usual brand names and flavour descriptors were significantly more likely (AOR 1.62, 95% CI 1.20–2.19, p=0.002) to respond that they did not know which products their peers would be interested in trying but not to respond 'none of these' compared to those who viewed fully branded packaging.

- Participants who viewed standardised white packaging with coded brand and limited flavour descriptors were significantly more likely both to respond with no interest (AOR 2.07, 95% CI 1.53–2.79, p<0.001) and 'don't know' (AOR 2.27, 95% CI 1.67–3.07, p <0.001).

- Participants who had tried/formerly (aOR 0.42, 95% CI 0.24–0.72, p= 0.002) or currently (aOR 0.29, 95% CI 0.12–0.72, p=0.008) vaped were less likely than those who had never vaped to report no perceived peer interest in trying any of the products.

Limitations

- The survey was carried out in Great Britain and 71.8% of participants were within occupational grades ABC1, limiting generalisability to the wider UK population.

- The survey took place in March and April 2021, before the rise in popularity of disposable devices, and so the findings may not reflect current perceptions of vaping products.

- Analyses were not pre-registered and so are considered exploratory.

- Subsample sizes of respondents with smoking and vaping histories were small, for example 158 who had tried or formerly vaped and 47 who currently vaped, so it was not possible to accurately interpret associations in these groups.

- The questions were framed in terms of peer interest rather than participants' own interest in trying any of the products, which may have reduced the accuracy with which the responses reflect perceptions.

- The phrasing of the question in terms of 'which product' peers would be interested in trying could have implied that they would be interested in trying one, increasing the likelihood of respondents selecting a product.

Taylor E, Simonavičius E, Nottage M, McNeill A, Arnott D, Cheeseman H, Hammond D, Reid J, Driezen P, D'Mello K, East K. Association of fully branded, standardized packaging and limited flavour and brand descriptors of e-liquids with interest in trying products among youths in Great Britain. Addiction. 2025 Apr;120(4):620-628. doi: 10.1111/add.16763. Epub 2025 Jan 13. PMID: 39803698; PMCID: PMC11907326.

Lindson *et al*: An update of a systematic review and meta-analyses exploring flavours in intervention studies of e-cigarettes for smoking cessation

Study aims

This systematic review and meta-analysis aimed to update a previous review investigating e-cigarette flavours in interventional studies included in the Cochrane Review on e-cigarettes for smoking cessation. Outcomes were smoking abstinence, abstinence from all tobacco or commercial nicotine products and allocated product use at six months or longer.

Key findings

- There was no clear association between e-liquid flavour and smoking abstinence or long-term use of the allocated study product (e-cigarette or nicotine replacement therapy).

- Comparisons of studies in which participants were offered a choice of flavours gave mixed findings, with some suggesting that sweet flavours may be preferred to tobacco or menthol and others having different results.

- There was evidence of flavour use remaining consistent during quit attempts, whereas some studies reported that participants changed flavours.

Limitations

- Most studies were assessed as being at high risk of bias.

- There were insufficient data available to draw a conclusion regarding any association between flavour and abstinence from both combustible tobacco and e-cigarettes.

- Heterogeneity between and within subgroups was detected.

- Conclusions are uncertain due to limited data.

Lindson N, Livingstone-Banks J, Butler AR, Levy DT, Barnett P, Theodoulou A, Notley C, Rigotti NA, Chen Y, Hartmann-Boyce J. An update of a systematic review and meta-analyses exploring flavours in intervention studies of e-cigarettes for smoking cessation. Addiction. 2025 Apr;120(4):770-778. doi: 10.1111/add.16736. Epub 2024 Dec 19. PMID: 39702981; PMCID: PMC11907327.

Kundu *et al*: Evidence update on the cancer risk of vaping e-cigarettes: A systematic review

Study aims

This systematic review aimed to update the findings of McNeill *et al*. (2022) in relation to any association between vaping and lung cancer, as well as overall cancer risk in people with different smoking statuses and histories. It also carried out subgroup analysis to investigate any associations in specific sociodemographic groups. The main analysis included papers published between July 2021 and December 2023, and the subgroup analysis additionally included the same papers as McNeill *et al*.

Key findings

- No increased incidence or prevalence of lung or other cancers was found in studies of people who vaped and had never smoked, and most cross-sectional or longitudinal studies did not find an increased risk.

- There was evidence from biomarker, in vitro and animal studies of cell changes linked to lung and other cancers, for example expression of inflammatory and oxidative biomarkers, reduced cell viability, increased apoptosis and tumour growth following exposure to nicotine e-cigarette vapour.

- Subgroup analyses showed mixed results and no overall differences in cancer risk by age or sex were identified.

Limitations

- Current smoking/vaping status was categorised by past-30-day use, for example dual use was defined as having both smoked and vaped in the preceding 30 days. Therefore, this would not capture use more than 30 days ago. Never smoking was defined as having smoked fewer than 100 cigarettes in a lifetime, whereas never vaping was defined as never having used an e-cigarette, so people categorised as never having smoked could have a smoking history.

- Most studies were carried out in animals or cells and, of the studies in humans, most were cross-sectional and so unable to indicate causality.

- Heterogeneity in study design and paucity of studies in humans precluded meta-analysis.

- Most studies examined acute effects of vapour exposure and only one investigated long-term e-cigarette use.

Kundu A, Sachdeva K, Feore A, Sanchez S, Sutton M, Seth S, Schwartz R, Chaiton M. Evidence update on the cancer risk of vaping e-cigarettes: A systematic review. Tob Induc Dis. 2025 Jan 28;23. doi: 10.18332/tid/192934. PMID: 39877383; PMCID: PMC11773639.

Begh *et al*: Electronic cigarettes and subsequent cigarette smoking in young people: A systematic review

Study Aims

This systematic review investigated any association between e-cigarette use and/or availability (e.g. changes in taxation/price or legal age of sale of e-cigarettes) and change in population smoking rates among studies of young people (aged 29 and under). Secondary outcomes were initiation, progression and cessation of smoking at individual level.

Key findings

- The analysis suggested an inverse association between e-cigarette availability/use and combustible tobacco use at the population level.
- Positive associations were found between e-cigarette use and subsequent initiation and progression of combustible tobacco use, although this evidence was judged to be very low certainty.
- Evidence on any association between e-cigarette use and smoking cessation was inconclusive.
- Evidence for all outcomes was judged to be 'very low.'

Limitations

- Most studies were conducted in the US and other countries, so findings may not generalise to the UK.
- All included studies had at least moderate risk of bias, and most had serious or critical risk.
- Many studies did not report on any differences in associations between sociodemographic subgroups, so it was uncertain whether associations vary between population subgroups.
- Several included studies used data from the same surveys, which may have led to overlap between datasets and greater similarity between study findings.
- It was not possible to rule out publication bias.

Begh R, Conde M, Fanshawe TR, Kneale D, Shahab L, Zhu S, Pesko M, Livingstone-Banks J, Lindson N, Rigotti NA, Tudor K, Kale D, Jackson SE, Rees K, Hartmann-Boyce J. Electronic cigarettes and subsequent cigarette smoking in young people: A systematic review. Addiction. 2025 Jan 30. doi: 10.1111/add.16773. Epub ahead of print. PMID: 39888213.

Jackson *et al:* Trends and patterns of dual use of combustible tobacco and e-cigarettes among adults in England: A population study, 2016–2024

Study aims

This repeat cross-sectional study used data from the Smoking Toolkit Study to investigate trends in dual use of e-cigarettes and combustible tobacco products among adults (18+) in England (n=128,588) between July 2016 and April 2024. Respondents who reported current use of both e-cigarettes and combustible tobacco were categorised into groups according to their product use frequency; daily or

non-daily. Trends over time were modelled and any associations between use patterns and harm perceptions of vaping, level of nicotine dependence and sociodemographic characteristics including age gender and occupational grade were investigated.

Key findings

- Prevalence of dual use increased from 3.5% (95% CI 3.1–4.0) in July 2016 to 5.2% (95% CI 4.6–5.9) in April 2024 (prevalence ratio 1.49, 95% CI 1.25–1.76). This was driven by an increase in vaping prevalence among adults who smoked from 19.5% (95% CI 17.4–21.7) to 34.2% (95% CI 30.9–37.8) (prevalence ratio 1.76, 95% CI 1.52–2.04), while smoking prevalence declined.

- The largest increases in dual use were seen in younger age groups, for example the prevalence ratio among respondents aged 18-24 who smoked was 3.04 (95% CI 2.28–4.23), compared with 1.66 (95% CI 1.17–2.37) in those aged 45-54 and no change in older age groups.

- The most prevalent pattern of dual use throughout the study period was daily smoking plus daily vaping, which did not change in prevalence.

- The prevalence of daily smoking together with non-daily vaping declined by over 50% - from 35.2% (95% CI 29.4–41.5) in July 2016 to 15.0% (95% CI 10.6–20.7) in April 2024 (prevalence ratio = 0.43 (0.29–0.63). The prevalence of non-daily smoking plus daily vaping almost tripled from 7.6% (95% CI 4.9–11.5) to 21.5% (95% CI 16.1–28.1), prevalence ratio 2.84 (95% CI 1.71–4.72).

- Respondents (including those who smoked cigarettes daily, non-daily and non-cigarette tobacco) who believed vaping to be less or equally harmful compared to smoking were more likely to vape daily than non-daily. For example, among respondents who smoked daily, those who believed vaping to be less harmful were more than twice as likely to report daily (49.4%, 95% CI 47.1–51.7) than non-daily (22.3%, 95% CI 20.5–24.3) vaping.

Limitations

- As a cross-sectional study, it is unable to establish the order in which respondents started smoking and vaping.

- The survey questions do not distinguish between people who exclusively smoke cigarettes and those who smoke other types of tobacco product as well as cigarettes.

- Data on vaping characteristics were not collected in all survey waves from 2022, limiting the number of data points available.

- The survey question about frequency of vaping does not distinguish between e-cigarettes and other non-combustible nicotine products such as nicotine replacement therapy, so it is possible that some participants were incorrectly identified as vaping daily/non-daily.

- Some respondents who vaped did not know their vaping frequency and so could not be included in the analysis.

Jackson SE, Cox S, Shahab L, Brown J. Trends and patterns of dual use of combustible tobacco and e-cigarettes among adults in England: A population study, 2016-2024. Addiction. 2025 Apr;120(4):608-619. doi: 10.1111/add.16734. Epub 2025 Jan 22. PMID: 39842468; PMCID: PMC11907328.

Search strategy

The Pubmed database is searched in the middle of every third month, for the previous three months using the following search terms: e-cigarette*[title/abstract] OR electronic cigarette*[title/abstract] OR e-cig[title/abstract] OR (nicotine AND (vaporizer OR vapourizer OR vaporiser OR vapouriser OR vaping)).

Based on the titles and abstracts new studies on e-cigarettes that may be relevant to health, the UK and the UKECRF, key questions are identified. Only peer-reviewed primary studies and systematic reviews are included – commentaries are not included. Please note studies funded by the tobacco industry are also excluded.

This briefing is produced by Julia Cotterill from Cancer Research UK with assistance from Associate Professor Jamie Hartmann-Boyce at the University of Massachusetts Amherst, primarily for the benefit of attendees of the CRUK UK E-Cigarette Research Forum. If you wish to circulate to external parties, do not make any alterations to the contents and provide a full acknowledgement. Kindly note Cancer Research UK cannot be responsible for the contents once externally circulated.